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In hoc Casu, ista Tria sunt consideranda, viz. Vitæ genus, Ætas, Ætatisque Periodus.

Primo enim à tam diurna exercendi desuetudine, vix potuit non evenire inæqualis Alimenti distributio. Quemadmodum itaque Offa, & sape Viscera, ex inepta Nutritione, supra modum augentur in Rhachitiide: pariter & hic Lien, ex eodem Nutritionis vitio, videtur ampliorem molem accipisse.

Principè, cùm secundò, hâc vite consuetudine usâ est illa Virgo, non in provectioni etate, sed florente adhuc adolescentiâ. Exercitia enim necessaria sunt, etiam ad debitam nutritionem: multò magis ad Partium aquale Incrementum.

Tertio, & in illa ipsa etatis periodo, quâ Menses primo effluere solent. Quibus inde suppressis, vel multum immunitis, iste sanguis, quem desidiosa Natura omisit eliminare per consuetas vias, ex parte in Lienem, quasi quoddam diverticulum, rejiciebatur.

Corollarium. Virginibus, nimia Exercitiorum intermissione, in primis circa finem secundi, aut principium tertii etatis Septenarii, pessima.

An Account of a Book. Osteologia Nova, or some Observations of the Bones, &c. Communicated to the Royal Society, in several Discourses, Read at their Meetings, by the Learned and Accurate Author, Clopton Havers, M. D. and R. S. Soc. Lond. 1691, Octavo, for Sam. Smith.

THE Author offering to give some Account of the manner, in which the Bones are first formed, supposes, that they, as all the other parts of the Body, are formed in the Egg before the Female is impregnated, and that the Seed of the Male does only put those Particles, which

which are the first Principles of the Spirits, and Humors, into motion, by which motion they begin a Circulation, and being expanded they dilate the containing parts, whose Dilatation both causes an Encrease in the Dimensions of the Animal, and makes them more capable of the Accession of new Particles to nourish and augment them.

Coming to describe the Nature and Structure of the Parts, which are the Subject of the Discourse, he begins with the *Perioftium*, or Membrane which invests the Bones, which consists of two sorts of Fibres, one of which lying next to the Bone it self, is derived from the *Dura Mater*, the other from the Tendons of the Muscles. The use of this Membrane is to cover the Bones : To convey Spirits into them for their Sense, and to assist in their Nutrition, to which end it has Fibres inserted into them; To limit their Growth; To keep some of them conjoyn'd; To joyn the Bones and their Cartilages together; to fasten the Heads and Tendons of the Muscles to the Bones; and lastly, for the safety and security of the Bones against Injuries, as it serves to make them sensible, and so gives the Animal a quick apprehension of any Mischief that threatens those parts, and directs us in our application of Remedies when they are injured.

The Bones, tho they are at first Gelatinous, and afterwards Cartilaginous, are when they come to their true and proper nature, solid and hard, consisting of terrestrial and saline Particles. These Particles, being in their several Series united at their Extremities, form Strings, and these Strings being united make distinct Plates, which lying one over another make the whole Thickness of the Bone. In and between these Plates he observes two sorts of Pores, some which run through every Plate, others which are formed between them for the Dispensation of the Medullary Oil to the Substance of the Bone. The Superficies of the Bones is unequal being

being rendered so by some superficial Cavities, and by passages which penetrate into them, the first of which are for enlarging their Surface, and strengthening the Adhesion of their Membrane to them; the other for the ingress of Blood Vessels into their Substance or Cavities. The Cavities of the Bones are in some large, in others small and numerous, whose Partitions are formed of Plates propagated wholly from those Plates which make the sides of the Bones in such as have long Cavities; and in them which are spongy, from Plates which run up the whole length of the Bone in that manner. And in some Bones there are *Fasciculi* of Strings which run off from the Plates in the Sides, and made a sort of *Cancelli*, or Net-work in the Cavity.

In the Bones there are Blood-Vessels, which serve for their Nourishment, which are many; the Arteries entering at one end, and the Veins coming out in vast numbers, either at the contrary extremity, or in some intermediate parts. And there are both Veins and Arteries belonging to the Marrow.

In the Teeth he observes a twofold Substance, one of a stony Nature, which is the Cortical or exterior part of so much of the Teeth as stands out of the Gums; the other truly Bone, consisting of *Lamina* or Plates, as the other Bones do.

In the second Discourse he gives an Account of the manner of Accretion, and Nutrition in general, and then particularly in the Bones. The Matter, which gives an increase to the Animal, is originally from the Chyle, the Particles of which designed for Nourishment being elaborated in the Mass of Blood, and so reduced nearer to the nature of a *Succus nutritius*, and disposed for a Separation, are secessed from the sanguineous Mass, by Glands seated on the Sides of the Arteries all over the Body. And here the Author takes occasion to speak of Glandular Secretion; to explain which he observes

observes, first that all motion in its proper tendency is direct, and that the Glandules are so seated, as to favour the motion of any Particles that strike against them in a right Line, more than the Veins; and having Pores adapted to the Figure of the Particles which they separate, the Particles do endeavour in their motion to proceed into those Glandules, and being entertained by them, are separated, and distinguisht from the rest of the Mass of Blood, and so assume the form of that Liquor we find separated by every Gland: And to prevent the Regurgitation of the separated Matter out of the Glandules into the Mass of Blood again, (because the Ducts, which convey it to the Receptacles, do not run so as to favour the direct motion of the Particles,) he supposes some contrivance like Valves in the Pores by which the Particles enter into the Glandules.

How the Situation of the nutritious Glandules agrees with his Assertion, that the Glandules are so seated as to favour the motion of a Particle in a right Line, more than the Veins, is shown by observing the gradual contraction of the arterial Channel.

He then goes on with the affair of Accretion, and the account is in short this, that the Nutritious Particles, being separated by the Glandules plac'd in the sides of the Arteries, are carried into those small nervose Pipes, or Interstices of the Fibres where the Spirits move, so that they fall in the way of the Spirits motion. The Spirits he supposes to have a twofold motion, one direct, the other rotatory turning upon their Axis. Whilst the Animal is capable of Accretion, and the Particles of which the solid parts consist are not entirely united at their extremities, but are capable of receding one from another, both laterally and at their extremities; the Spirits act upon the nutritious Particles, which are of a viscous nature, by their rotatory motion, by which they carry them to the sides of the Fibres and bony Strings, driving

some against the sides of their parts and forcing them out laterally; others into the Interstices between their extremities, (thereby elongating every Series of them;) where they are apponed, and fixed, and thus the parts increase both in their thickness, and longitude. But after the Particles are united at their extremities, and no longer capable of making room to lodge the nutritious parts out of the way of the Spirits direct motion; then the Spirits come to act upon the nutritious Matter by that motion, and to drive it so thorough the nervous Channels that it has not the liberty of stopping, and adhering, and so the Accretion of the Animal Ceases.

Nutrition he makes to be no reparation of the loss of the substance of the Solid parts ordinarily, but only a continual succession and supply of Spirits, and of all those fluid parts, which fill the containing parts and preserve them distended.

The Rickets being a Distemper in which the Accretion of the Bones is concerned, he does suppose that the incurvation of the Bones is neither from a preternatural shortness of the Muscles, nor an unequal supply of Spirits, and nourishment of the several parts of the Bones; but from a different temper in the several parts of them: that on one side they continue in their Affinity to the Nature of the Cartilage, whilst on the other they approach nearer to the temper of a perfect Bone; so that the Particles are in one place more apt to recede and to give way for the accession of new Nourishment: and consequently there is a greater increase than in the other. From which unequal Accretion the Bone will be incurvated, and the Concave of their Arch will be on that side which is least augmented, and the Convex on the other.

For Venereal Nodes in the Bones; he supposes that the venenoze Matter does eat some little holes in the *Laminae*, and so makes room for the reception of some of the nutritious Matter, on one side of the Spirits motion: and then

then the Spirits by their rotatory motion will determine some of it to those little holes ; so that if any of those preternatural *Foramina* reach to the Superficies of the Bone, some part of the nutritious Juice will be thrown out upon the surface of the Bone, where indurating into a bony substance it produces gummatous inequalities.

The third Discourse concerns the Marrow, which has blood Vessels, both Veins and Arteries. The Organs by which the Medullary Oil is separated, are small Vesicles of Glandules, which are conglomérated into distinct Lobules contained in several Membranes or Baggs, which lie contained in one common Membrane investing the whole Marrow : all which both Vesicles, Baggs and Membrane are propagated from the exteriour Coat of the Arteries. The passage of the Medullary Oil from all parts of the Marrow to the Bone is not by Ducts, but by Pores formed in the Vesicle, by which it passes from one to another, till it arrives at the sides or extreme parts of the Bone.

The Medullary Oil, which is supplyed to the Intertices of the Joyns, passes into them by passages penetrating through the Bone into these Cavities, and formed for this end.

The use of the Medullary Oil is either common to all the Bones, or more proper to the Joyns. To all the Bones it is serviceable, and necessary to preserve their temper, and keep them from being brittle. In the Articulations, First, It lubricates the extremities of the Bones, and so makes them more apt to be moved. Secondly, It preserves the ends of the articulated Bones from an inordinate incalescence. Thirdly, It prevents the Attrition of those parts of the Bones, which are rubbed one against another. It is likewise beneficial to the Ligaments of the Joyns in preserving them from dryness and rigidity, and lubricating those parts of them, which slide upon the Bone. Those Cartilages also which are joyn'd to any of the Bones it preserves flexible.

In the fourth Discourse we have an account of a particular sort of Glands, which he calls the mucilaginous Glands seated in the Joyns. These are of two sorts ; some are small, and in a manner miliary Glands, being Glandules placed all upon the same Surface of the Membrane, which lies over the Articulations. The other sort are conglomerate, or many Glandules collected and planted one upon another, so as to make a bulk, and considerable Glands. In some of the Joyns there are several of them, in some there is a single Gland. For the Structure of these large Glands, they consist of small Vesicles, which are not gathered into several Lobules or Bags of Glandules, but are disposed upon several Membranes lying one over another, of which Membranes there are several in every one of these Glands, which appear evidently in some that are Hydropical.

They have their Blood Vessels, as other Glands, but their Veins have a particular flexure in their course for retarding the return of the Blood from the Glands, that the mucilaginous Liquor, which is not separated with the greatest expedition, may have time to penetrate the secretory Pores of the Glandules.

The large mucilaginous Glands are variously seated, some in a *Sinus* formed in the Joyn, others stand near or over against the Interstice between the articulated Bones, but in general they are so placed as to be squeezed gently, and lightly prest in the inflexion or extension of the Joyn, so as to separate a quantity of Macilage proportionate to the motion of the part, and the present occasion, and yet without any injury.

We have also some description of the common Membrane of the Muscles, how it is every where set thick with the small mucilaginous Glands ; and about some Joyns which are often moved, and where the Tendons run backward and forward more considerably, it has some larger or conglomerate Glands.

The

The design of all these Glands is to separate a mucilaginous kind of Liquor, that serves principally to lubricate the Joyns, to make them so slippery as to be moved with the greatest facility imaginable. It serves likewise to preserve the ends of the articulating Bones from Attrition, and an immoderate incalescence. But all these things it performs in Conjunction with the Medullary Oil. Of which two Ingredients is made a Composition admirably fitted for those ends: For the Mucilage adds to the lubricity of the Oil, and the Oil preserves the Mucilage from growing too thick and viscous.

The Author observing the same sort of Glands to lie between the Muscles and Tendons, supposes that there is the same mixture of an oily and mucilaginous Substance, the one being that Fat which is found between the Muscles, and is supplyed by the adipose Glands; the other being separated by the mucilaginous Glandules, of which the common Membrane of the Muscles is every where full. This mixture in the interstices of the Muscles lubricates them and their Tendons, and preserves them from shrinking, and from growing dry and rigid.

For the Generation of this Mucilage he supposes that Nature has designed one large *Viscus*, and that this is the Office of the Spleen; the Glandules of which he makes to have two secretory Pores, by one of which some Acid, and by the other some Austere Particles are separated; which meeting in the small Cavities of the Glandules, they are converted into a mucilaginous and gummosous Substance, having observed that the Spirit of Vitriol mixt with a Decoction of Galls, will produce a Gum.

In the next place follows an account of some Experiments made with the Mucilage, the most of which come to this, that all Acids do coagulate it, as all Austeres, and Austere Acids: but with this difference that the *Coagulum* or Curd made with Acids only is tenderer than that which

which is produced by an Austere only, or an Austere Acid.

These Experiments being made and described in order to explain the Nature and Causes of a Rheumatism, and the Gout, these Distempers are next treated of.

The Matter or Humour producing a Rheumatism is made to have a different Nature in several Patients; in some it is Acid, in some Saline, and in others Acrious. This Matter whilst it lies in the Mass of Blood, temper'd with the other parts, scarce gives any sensible effect: but the mucilaginous Glands between the Muscles, (as we see other Glands of the Body often do,) serving sometimes for the Depuration of the Sanguineous Mass, by separating from it incongruous and morbidick Particles, this Matter so separated comes to be more strong and sincere, so as to have a sensible effect upon the Fibres, pricking and irritating of them, and if the Matter be an Acid or Austere, it affects the Mucilage it self, so as to coagulate it in the Interstices of the Muscles, which produces that Rheumatism, which is fixt, and where the Blood is very fizzy.

As there is a difference in the Matter, which produces the Distemper, so it is to be treated with different means. Where the Matter is thin and acrious; with temperate and cooling Medicines, together with such gentle Dia-phoreticks, as have themselves no Acrimony. Where the Humour is salt; with diluting and aqueous things together with some Diureticks. And when the Mucilage is coagulated with an Acid above other things, the most proper Medicines seem to be such as dissolve a *Coagulum*, such are *Oleum Tartari per deliquium*, Spirit of Salt Armoniack, and Spirit of Harts-Horn.

In the Gout the humour likewise is of a different Nature; sometimes Acid, or Saline, and sometimes Acrious. This Matter is separated in the manner of a *Crisis* by the mucilaginous Glands of the Joyns, where it always

ways affects the sensible parts about them ; and if it be Acid makes a Coagulation, or inspissates the Mucilage, and then the Gout sticks some considerable time. The generation of the *Tophaceous* Matter in the nodose Gout is accounted for, from the Experiments made with Acid-Austere Liquors mixed with the Mucilage ; so that where the Gout is nodose, the Mucilage is first coagulated by some Acid-Austere Matter, and the *Coagulum* made by such a Matter is not so easily dissolved, as when it is made by an Acid only. This *Coagulum* therefore being imprisoned, and the more gross and earthly parts being incapable of an evaporation or being otherwise spent, are concentrated and indurated by the evaporation or flowing off of the moist Particles, and so produce a hard, and chalkey Substance.

The last Discourse is of the Cartilages, which approach near to the Nature of the Bones, but differ from them in their Formation, and in their flexibility : This flexibility is from the Figure and order of their parts, which are such that the Particles (as they must slide one way or other in the inflexion of a Body) may move without interrupting the continuity of the whole, even when they recede from one another, unless they are forced too far. That recouling, which is found in these and other flexible Bodies that have a rigidity, arises from a pressure made by the spring of the Air, either implanted and shut up in the interstices of the Particles, as when the Particles are driven nearer to one another, and those Interstices are contracted : or by the Elastick power of the external Air, when the Particles of the Body recede from one another, and drive up the spring of that Air.

The Cartilages have a Membrane every way like to the *Periostium*, and is a continuation of it, where they are joyned to any Bones. Blood Vessels they likewise have in great numbers.

The use of the Cartilages in general is to give a strength to some parts, which did stand in need of such Bodies as both were flexible and had a rigidity. Those of the Ribs are designed to make them capable of an Elongation, that so they may protrude the *Sternum* one way, and drive back the *Vertebres* of the Breast the other, whereby there is an addition made to the capacity of the Breast. These Gristles serve likewise in the contraction of the Breast. For having their natural Figure altered in the elevation of the Ribs, and the ampliation of the Cavity of the *Thorax*, they do naturally endeavour to regain their first Figure, and to return into their proper posture, by which endeavour they help something towards the depression of the Ribs, and the contracting the Cavity of the Breast.

F I N I S.

L O N D O N.

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